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Impact of Green Economy-A Performance Analysis of India's Transition to Green Energy

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Abstract
Green economy's concept is not just for monetary returns but focus is also on environmental protection, which further ensures sustainable and resilient economies. Environment and natural resources being the most valuable assets, should be preserved and protected. Supporters of Green economy or low-carbon economy believe that all economic policies should be drafted and implemented with the environment protection as the main concern.

Environmental hazards impede the economic development because economic growth has a huge environmental and social cost. Green economy is all about erasing or minimizing this cost of development.

India has lately been in the midst of global negotiations on issues of global trade and climate change. Fighting climate change cannot come at the cost of halting the urgent fight against poverty. The shift to a new economy with a low carbon footprint does not mean reversion to poverty. New innovative technologies would be a critical factor in the transition to green economy.

This paper through critical analytics based on secondary research, would endeavour to evaluate the various factors responsible for the execution of green economy, such as renewable energy sources (solar, wind, tidal, bio-mass energies etc.), 'Swachh Bharat's waste management program, sustainable bio-fuels (clean fuels), treatment of Municipal Solid Waste (MSW), Waste- to-Energy programs, 'Reduce & Recycle' programs, electric vehicles impact, road-dust management etc.

Keywords: *Green energy, environment, carbon-footprint, renewable-energy, clean-fuels, waste-Management, innovative-technologies*

INTRODUCTION
Green economy is defined “as a means to achieve sustainable development. A green economy in the context of sustainable development and poverty eradication should protect and enhance the natural resource base, increase resource efficiency, promote sustainable consumption and production patterns, and move the world towards low-carbon development.” On the other hand, the scientific studies reveal a serious damage to environment and put question mark on the sustainability of development at the cost of human race, triggering the need for an alternate model of development.

Industrialization caused felling of trees which caused not just a decrease in availability of obligatory oxygen but also compounded the problem of carbon emissions triggering air pollution and global warming. The development pace and GDP rose but ironically such indicator does not take into account the social and environmental costs arising out of depletion of natural resources, carbon emission, pollution of air water and soil and accumulation highly toxic non-biodegradable solid wastes including plastic, and other e- wastes.

Green economy calls for generation of income and employment by private and public investment that preserves biodiversity, reduce carbon emission and pollution while increasing resource efficiency. The UN General Assembly had provided guidance to the member states by grouping the green economy and sustainable development theme into seven “tracks”: green stimulus packages, eco-efficiency, greening markets and public procurement, investments in sustainable infrastructure, restoration and upgrading of natural capital, getting prices right, and ecological tax reform.

India has true intention to adapt to green economy and can make green growth a reality by adopting strategies to reduce environmental degradation at the minimal cost of 0.02% to 0.04% of average annual GDP growth rate. According to a World Bank Report, this will allow India to maintain

a high pace of economic growth without jeopardizing future environmental sustainability. The annual cost of environmental degradation in India, amounts to about Rs. 3.75 trillion ($ 80 billion) equivalent to 5.7% of GDP.

According to World Bank Report, "Diagnostic Assessment of select Environmental Challenges in India", Green growth would be economical for India as 10% particulate emission reduction by the year 2030 will lower GDP nominally, which would just be a loss of 0.3% to GDP. On the contrary, a 30% particulate emission reduction lowers GDP by about $97 billion, or 0.7% with not much impact on the growth rate. This shows that adopting Green Economy principles will not scuttle growth in India.

OBJECTIVES OF THE RESEARCH STUDY

1. To study the various issues relating to the concept of a green economy;
2. To examine the nature and extent of green energy initiatives taken by India;
3. To give appropriate suggestions for attaining clean energy in India

HYPOTHESIS OF THE RESEARCH STUDY

India is not rigorous and honest in achieving a green economy. (H 0)

RESEARCH METHODOLOGY

This analytical research work has taken the time series secondary data provided by World Bank (National Development Indicators) and United Nations during the period 2000 to 2015. This study considers the appropriate indicators of environment, human well-being and social equity relating to a green economy of India. We have tried to extrapolate this data to the year 2018 and beyond. This research study highlights some key areas of a green economy and their indicators and the main challenges to developing a framework for a green economy.

The data accumulated from the above-said secondary sources was subjected to various statistical tools for verification and interpretations, such as; descriptive statistics (mean standard deviation and percentile). The data once collected was analyzed by using the Statistical package for social sciences (SPSS). The tests used for analysis were independent 't' –test, multiple regression analysis and binary logistic regression analysis.

SUSTAINABILITY ISSUES

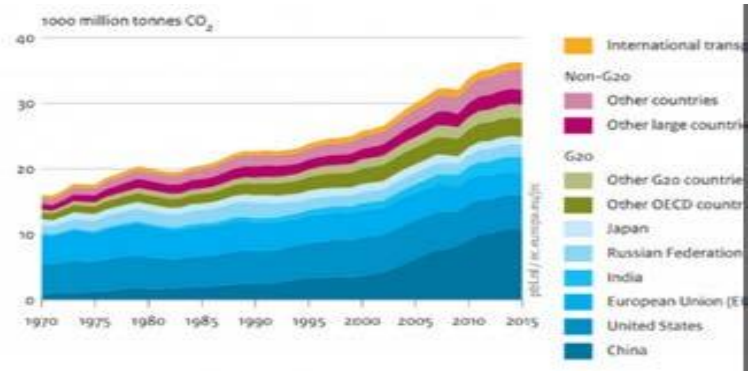
According to a report published in Hindustan Times a national daily, "India was ranked the third-highest carbon dioxide (CO_2) emitter in the world in 2015 after China and USA, according to the International Energy Agency, a Paris-based energy policy advisor to 29 countries globally rallying for clean energy".

The study titled 'CO_2 Emissions from Fuel Combustion (Highlights) 2017', saw CO_2 levels from fuel combustion increase in India from 181 million tonnes (MT) in 1971 to 2,066 MT in 2015, a 1,041% increase. If we exclude China, India's emissions accounted for 46% of total emissions in Asia.

Netherlands Environment Assessment Agency showed that global CO_2 emissions in the year 2016 remained largely static—neither increasing, nor decreasing. Compared to –0.2% growth achieved in the year before, 2016 saw a 0.3% change in CO_2 emissions. Greenhouse Gas (GHG) emissions as a whole, rose by 0.5%, reaching an equivalent of 49.3 gigatonnes of CO_2.

This comes as a wake-up call for India—the only major emitter to register a significant increase in GHG emissions. Among the emitters that make up nearly two-thirds of all global GHG emissions, Russia and the US managed to decrease their emissions by 2% and Japan by 1.3%. In Brazil and the UK, emissions reduced by over 6%. Emissions from China and EU-member states saw no change from their levels in 2015. India and Indonesia, on the other hand, registered 4.7 and 6.4% increases in their GHG emissions according to the report.

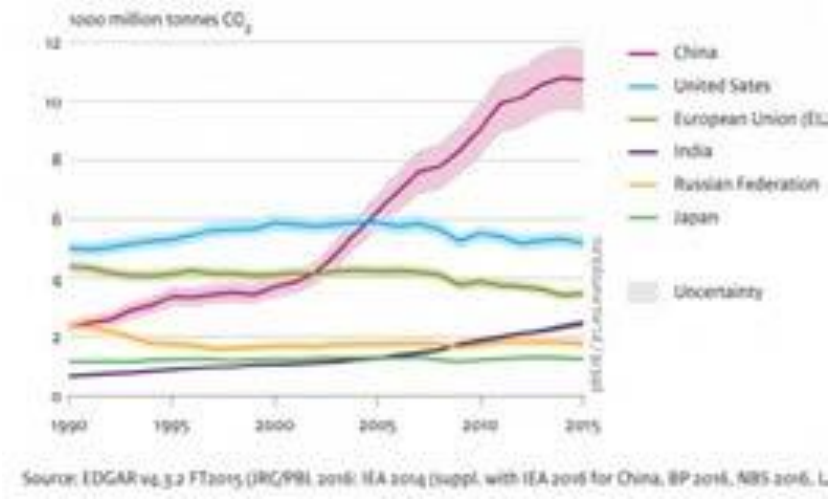
GLOBAL CO_2 EMISSIONS PER REGION FROM FOSSIL-FUEL USE AND CEMENT PRODUCTION



Source: PBL Trends in Global Emissions Report 2016

The global slowdown in emissions has been assigned to the decreased use of fossil fuels, mainly coal, and the increasing usage of renewable energy. However, India remained one of the few big emitters investing more in thermal power as coal consumption rose by 4% in the country.

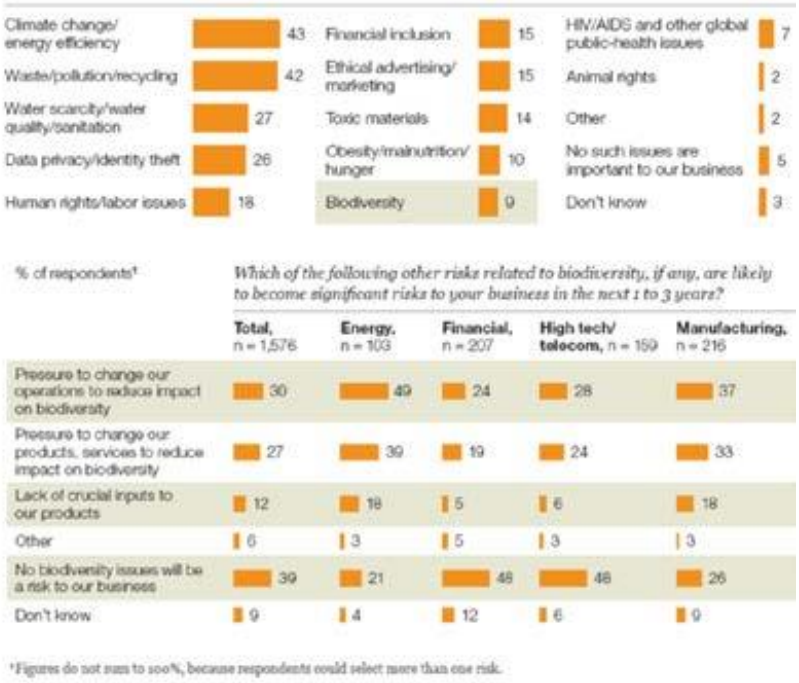
CO_2 EMISSIONS FROM FOSSIL-FUEL USE AND CEMENT PRODUCTION IN THE TOP 5 EMITTING



Source: PBL Trends in Global CO_2 Emission Trends Report 2016

India has committed to reduce its emissions by 35% of 2005 levels by 2030 and to vastly expand its renewable energy capacity. The nation aims to have 100 GW of installed solar capacity by 2022. The National Electricity Plan of 2016 states that 56.5% of India's installed power capacity will be from renewable energy within the 10 years to 2027. Presently, the coal and other fossil fuels meet about 70% of India's power demand. Greenhouse gases include not just carbon dioxide but also methane, nitrous oxide and fluorinated gases, which constitute 28% of all GHG emissions, and India, contribute to over 30%.

Mckinsey & Co. had researched and given the following findings about the importance of bio-diversity:



(Source: Mckinsey & company)

SECTORAL PRIORITIES OF INDIA AT RIO+20: (10 CONDITIONS FOR GREEN ECONOMY)

(i) Poverty eradication and livelihood security; (ii) Universal access to modern energy services; (iii) Prevention and reversal of land degradation; (iv) A forestation; (v) Watershed development in dry lands; (vi) Rural connectivity; (vii) Mass transport; (viii) Conservation and sustainable use of biodiversity; (ix) Clean water and (x) Facilitation of technology development and transfer

INDIA'S TRANSITION TO GREEN ENERGY

SOLAR ENERGY

'International solar alliance' (ISA) had its meeting in New Delhi in March'2018, with the participation of many countries of the world. This was in continuation of the United Nations climate change talks in Paris in November'2015. There are 121 countries which have signed up for the global solar alliance. India has made a commitment to generate 100 gigawatts (GW) of solar energy by 2022, part of the 175 GW target for renewable energy.

ISA being headquartered in Gurugram, it is expected that India would develop it as a technological hub for innovation in clean energy. Solar energy can reduce the electricity bill by 20-30% and at the same time, the same tariff is assured for the next 25 years. It is a one-time and risk-free investment with assured returns of 15-30% per annum.

Both Indian Central and State Governments have provided a number of incentives to promote solar energy in the country. For example, if one has a residential property, then he is entitled to a 30% subsidy, subject to a maximum of Rs. 17,070 per KW, by the Solar Energy Corporation of India, on first-come-first-served basis. Any surplus power generated can be fed back into the grid, thus the user can not only save but also make money by going solar.

Further, electricity taxes, cess, electricity duty, wheeling charges, cross-subsidy charges, transmission & distribution charges have been waived off for both ground-mounted and roof-top solar projects. As per Haryana Solar Power Policy 2016, large projects will be provided 100% exemption from payment of fee and stamp duty charges for registration of rent or lease deeds for the land required for setting up these projects.

GREEN BUILDINGS (ENERGY EFFICIENT BUILDINGS)

- The basic design of the building needs to be such that maximum natural light is pulled inside the building. This will help utilize the natural light source.

• While allowing the natural light to come in, the design has to ensure that maximum heat is kept out. This will help reduce energy on artificial climatic control. In case of cold regions, the vice versa has to be kept in mind while designing.

• The interior design of the building be such that there is maximum propagation of natural light even to the deep interiors of the building, which may not have direct window or light source available. This helps save energy in artificial lighting.

• The design of the building needs to be such that maximum clean rainwater can be collected for re-cycling or harvesting. The rainwater can be efficiently recycled where the rain is in plenty and pure water is scarce. The rainwater harvesting helps replenish the ground water and helps reduce the power consumption in water abstraction process.

• The design of the building needs to be such that maximum existing green cover is utilized for creating a cool environment and possibly create additional green cover such that the environment can be kept cool around. This helps in conserving precious energy.

• The construction specifications of the building have to be such that high 'Energy Efficient' material may be used. For example, fly ash blocks may be used instead of conventional bricks, thus helping save large volumes of energy that goes in manufacture of bricks.

• The specifications of glass to be used in windows can be such that it serves several purposes in one go –

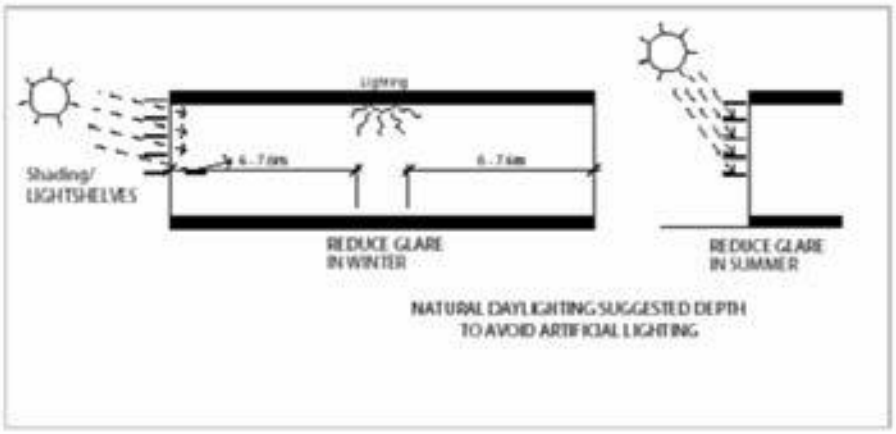
(a) Prove to be heat reflective and resistant, (b) prove to be sound barrier, (c) prove to provide strong security to the occupant, (d) prove to avoid use of any additional metal grill or covering, (e) prove to pull in precious natural day light.

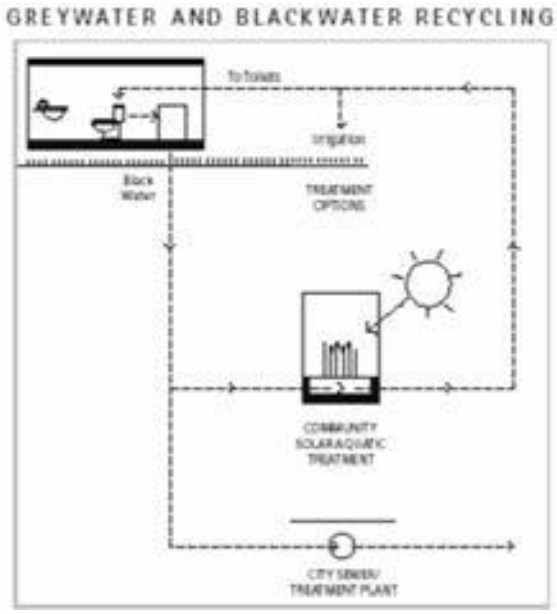
• The specifications of terrace roof covering and external cladding of the building to be such that they provide good insulation to the internal environment and keep out the un-wanted heat.

• The specifications of high 'Energy Efficient' electrical installations like transformer, capacitor bank, etc. can do wonders to the overall efficiency of a building. Besides, the use of fluorescent lamps instead of incandescent lamps is very important pre-requisite to 'Energy Efficient' building.

• The specifications of the interior and exterior material to be such that it has a long life, requires only regular cleaning or maintenance, and does not need regular re-doing. This makes a building 'Energy Efficient' over a long period of time.

• The installations within the building can be made to be more 'Energy Efficient' by recycling of water within the premises. The wastewater can be treated with the help of Treatment Plant and used for horticulture activity. The dirty water can also be treated to be re-used in flush and washing roads and pavements.





BIO-ECONOMY (BIO-FUELS)

New Delhi hosted an International Conference on Sustainable Bio-fuels (ICSB)'2018 on 26th & 27th Feb.'2018. This event was meant for discussing strategies for the large-scale global adoption of clean fuels as an alternative to carbon-intensive sources, such as diesel and petrol. The Conference deliberated on deployment of low-emission fuels, such as ethanol and bio diesel, besides various other forms of renewable energy sources.

The Conference discussed about development of second generation ethanol (E2G), bio-hydrogen and algae-based bio diesel. For example, in Brazil, 88% of all new cars are fitted with dual-fuel engines. This country has a mandatory regulation to sell petrol with a blend of 27% anhydrous ethanol. They are going to come with a new policy 'Renova Bio', wherein all oil companies would be encouraged to sell more ethanol, thus earning 'de-carbonization credits'.

Brazil is producing about 27 billion litres of ethanol, making it the second largest producer of the world. As per a research report, Brazilian ethanol can substitute up to 13.7% of petroleum consumed worldwide and reduce up to 5.6% of CO_2 emissions by 2045.

India also has a National policy on Bio-fuels, 2009. The Government of India decided to go for E2G way in Dec.'2014, by taking account of the surplus of biomass available, such as wood chips, cotton stalk, rice straw etc. Further, in 2016, India inaugurated its first demonstration bio- refinery in Uttrakhand and also the foundation stone of a commercial plant was laid in Punjab.

India is also pursuing its R&D efforts in the field of algae-based biodiesel, cellulolytic enzymes and alcohol-producing bacteria.

E-VEHICLES

Electric-powered vehicles are the new alternative and is being considered as a disruptive technology. The petrol engines produce more CO_2 while diesel engines produce more soot and particulate matter. It is for this reason that CNG (Compressed Natural Gas) was implemented in Delhi in 2001, in commercial vehicles. CNG usually results in reduction of hydrocarbons, carbon monoxide, and oxides of nitrogen. However, the higher density of private and commercial vehicles on Delhi roads have let the particulate matter (PM) levels to new heights.

PM10 may penetrate through the nasal cavity into the inside of bronchi. The smaller particles of PM2.5 can penetrate into the bronchi oles and alveoli. The ultra-fine particles with diameter of less than 0.1 micron can penetrate in the lung tissues and bloodstream. There is a correlation between PM2.5 air pollution and diabetes, pre-mature birth, cancer, autism in children, dementia in elderly and diseases of central nervous system. Such pollutants not only reduce the average life span of an individual but are also detrimental to the economy of the nation.

Besides motor vehicles' tailpipe emissions, major other sources of particulate matter are road-dust re-suspension, abrasion of brakes & tyres, power plants, waste incinerators, furnaces, heaters in home, bulk cargo handling, livestock and some industrial processes.

WASTE MANAGEMENT PROGRAMS (E.G. SWACHH BHARAT ABHIYAAN)

According to Basel convention, waste is defined as: “Wastes are materials that are not prime products (i.e. products produced for markets) for which the initial user has no further use in terms of his/her own purposes of production, transformation and consumption and of which he/she wants to dispose. Wastes may be generated during the extraction of raw material, the processing of raw material into intermediate and final product, consumption of final product and other human acts.”

WASTE MANAGEMENT is the collection, transport, processing or disposal, managing and monitoring of waste material. The term usually relates to material produced by humans and the process is generally undertaken to reduce their effect on their health.

SOME OF THE WASTES ARE OF FOLLOWING TYPES:

Radioactive waste; Plastic waste; Industrial waste ; Bio-medical waste ; Toxic waste ; Municipal Solid Waste (City waste, kitchen waste, inhabitants waste)

The last one is mainly generated by common citizens and residents of the country, which has to be tackled methodically. India generates over 1, 50,000 tonnes of municipal solid waste (MSW) per day. Mumbai is the world's fifth most wasteful city. However, just about 83% of waste is collected and less than 30% is treated. As per a World Bank report, India's daily waste generation is expected to reach 3,77,000 tonnes by 2025. A serious consequence can be seen at Delhi's Ghazipur landfill site, where waste burning is causing lot of pollution.

Under Prime Minister's Swachh Bharat program, there is a mission to provide toilets for all, and manage our waste well. ‘3R’s concept is based on (i) Reduce waste (by refusing unnecessary packaging etc), (ii) Reuse what we can, and (iii) Recycle the rest to reduce the water, energy and pollution from making things from virgin materials. Presently in year 2018, out of 82,607 wards, 51,734 wards have now 100% door-to-door waste collection. About 88.4 MW of energy is generated from 'Waste-to-Energy (WTE)' projects.

According to researchers, Ramandeep Singh and Soyen Park, South Korea has one of the world's most sophisticated waste management systems. It has been able to reduce MSW by 40% and at the same time, its GDP has increased by 5-times. Instead of incineration and landfills, it is focussing on 'Reduce & Recycle'. It has now the second-highest recycling rate (60%) in the world, after Germany. They are also using landfill gas as boiler fuel. One of their world's largest landfill, Sudokwon landfill is being converted into 'Dream Park', a leisure and environmental education centre. Similarly, the world's first landfill-powered hydrogen plant was built in South Korea in 2011, and over 60% of new and renewable energy is produced from waste.

RECYCLING DIFFERENT WASTE STREAMS

Recycling at Home: All wastes are useful if they are not mixed up. All we need to do is to keep our kitchen wastes (food, fruit, and flowers) unmixed with other waste. Then it can be used to make biogas for cooking, or organic manure for our home gardens, farms and fields. Other waste can be reused or recycled. 1-2% of India's urban population earns its living by recycling waste. If we keep it clean and unmixed with food waste, and give it to waste-pickers, it will fetch them better value, like old newspapers sold from homes and offices. Waste-pickers will then become waste- sorters and it will improve their incomes and help their children go to school.

DRY LEAVES AND GARDEN WASTES can be collected weekly for compost in nearby parks for use as organic manure to replace or reduce synthetic fertilizers. Burning leaves is banned by law. Both citizens and doorstep collectors and their superiors should work together to stop atmospheric pollution, asthma and global warming caused by burning.

TENDER-COCONUT SHELLS AND SUGARCANE JUICE WASTE bags can be made into fuel pellets by separate collection, shredding, drying and briquetting. Doorstep collected coconut shells can be stored at processing point until a truckload can be moved to briquetting unit.

PREVENT LITTERING OF FOOD WASTES The sale of peanuts in shells or green-gram on their stalks or sugarcane chewing-bits can be allowed in markets to take home, but not at bus- stands or railway stations or outside public parks. Persons love to buy this "time-pass" food and throw all the shells etc. onto the floors of buses, trains, waiting-rooms and pathways. Peanuts and gram which cause no litter may be allowed.

THIN-FILM PLASTICS, MULTIFILM SACHETS AND EXPANDED POLYSTYRENE (Thermocole, Styrofoam) can be finely shredded and used to double the life of bitumen (tar) roads. They can also be converted to diesel-like fuel in P2F (polymer to fuel).

TAILORING WASTES can be used for pillow stuffing. If pure cotton waste is collected separately, it fetches good value from textile mills.

OLD CLOTHES can be collected periodically for donation to the needy.

E-WASTES LIKE CELL-PHONES AND COMPUTERS, can be refurbished and donated, or recycled. E-waste can be collected at doorstep once in three months on pre-announced dates at no cost. Alternately, drop-off centres can be designated where e-waste buyers will perhaps purchase items on fixed dates as they do from businesses.

ASH FROM WOOD-BURNING is consumed in villages and is a useful soil enriched for farms as well as used for washing vessels. If unwanted in larger towns, cold ash can be added to the wet waste collection bins going for composting but not to biogas units.

BANNERS, HOARDINGS AND VINYL are a tremendous non-recyclable nuisance waste because they are now made of non-recyclable PVC which releases dangerous dioxin when burnt. 80% of India's total usage is imported from China, which has banned PVC banners in its own country. The solution for this is city resolutions permitting only PVC-free Flex and Vinyl, which are now made in India from fully recyclable polythene.

CONSTRUCTION WASTES ON ROADS: Building sand is often unloaded onto roadsides and even spills onto the carriageway (tarred or concreted portion) making the city look untidy and obstructing traffic. Though this is not a 'waste' material, it needs to be managed neatly, by enclosing the sand in a spill-proof border of bricks, blocks or simply filled sandbags. This will prevent spillage of sand onto the road which is dangerous for two-wheelers. Also such spilled sand often gets into open drains, costing the city a lot in drain desalting and also flood damage. Municipal officials must insist on such spill-proof management of piles of sand and stone aggregate. Monthly cleanup drives on pre-informed dates can be arranged to separately collect leftover sand or bricks or stones as free raw material for repair works.

CALCULATE ENERGY BALANCE FOR ALL NEW TECHNOLOGIES Energy in the form of heat or electricity can only be obtained from waste if there is enough energy in the waste in the first place to take care of plant operations and leave a surplus. That is why Energy Balance to calculate 'Energy In and Out' is so important before selecting a particular technology.

(Sand should not be left without enclosure, as the sand spills on the road, causing risk of skidding to 2-wheelers)

(Sand or left-over construction items should be properly enclosed, say with bricks)

(Ref.: 'Swachh Bharat Mission Newsletter-Nov.'2017)

DATA RESULTS AND ANALYSIS

This researcWh has selected following indicators for accounting of green performance of India. Indicators of Resource Efficiency:

Total Renewable Electricity Generation						
Sr. No	Year	In Billion Kilowatt Hours (000,000,000)	Annual % Change	Indian Population In Crore (00,00,000)	Annual % Change	Per Capita Renewable Electr. Generation (Khr.)
1	2000-01	77	0.00	101.4	0.00	76
2	2001-02	77	0.00	102.9	2.00	75
3	2002-03	68	-12	104.6	2.00	65
4	2003-04	80	18	105.1	0.37	76
5	2004-05	90	13	106.6	1.00	85
6	2005-06	109	21	108.1	1.00	101
7	2006-07	123	13	109.6	1.00	112
8	2007-08	133	8.00	113.1	3.00	118
9	2008-09	125	-6.00	114.8	2.00	109
10	2009-10	123	-2.00	116.7	2.00	105

11	**2010-11**	135	10	117.3	1.00	115
12	**2011-12**	160	19	119.1	1.00	135
13	**2012-13**	160	0.00	121.1	1.00	133
14	**2013-14**	166	4.00	122.1	1.00	136
15	**2014-15**	174	5.00	123.7	1.00	141
16	**2015-16**	182	5.00	130.1	5.00	140
C.G.R		**7.00%**		**2.00%**		**5.00%**
MEAN		**124**		**113.5**		**108**
C.V		**30%**		**7.00%**		**24%**

(Source: 1-U.S Energy information administration -http://www.eia.gov or World development Indicators-last updated: 28/07/2015. 2-Population Statistics Source: Central Intelligence Agency, Washington, D.C)

Adjusted Saving: Natural Resources Depletion			
Sr. No.	**Year**	**% of GNI**	**Net Annual Percentage Change (%)**
1	**2000-01**	2.83	0.00
2	**2001-02**	2.72	-0.11
3	**2002-03**	2.69	-0.03
4	**2003-04**	2.73	0.04
5	**2004-05**	2.86	0.13
6	**2005-06**	3.02	0.16
7	**2006-07**	3.62	0.6
8	**2007-08**	4.04	0.42
9	**2008-09**	5.55	1.51
10	**2009-10**	3.01	-2.54
11	**2010-11**	4.19	1.18
12	**2011-12**	4.26	0.07
13	**2012-13**	3.23	-1.03
14	**2013-14**	3.14	-0.09
15	**2014-15**	4.12	0.98
16	**2015-16**	4.22	0.10
C.G.R		**3.00%**	
MEAN		**3.51**	
C.V		**23%**	

(Source:World Bank staff estimates based on sources and methods in World Bank's "The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium"-2011 or World development Indicators-last updated: 28/07/2015)

Energy Use			
Sr. No.	**Year**	**kg of Oil Equivalent Per Capita**	**Annual Percentage Change (%)**
1	**2000-01**	438	0.00
2	**2001-02**	438	0.00
3	**2002-03**	444	1.00
4	**2003-04**	448	1.00
5	**2004-05**	466	4.00
6	**2005-06**	479	3.00
7	**2006-07**	498	4.00
8	**2007-08**	521	5.00
9	**2008-09**	538	3.00
10	**2009-10**	585	9.00
11	**2010-11**	599	2.00
12	**2011-12**	616	3.00
13	**2012-13**	637	3.00
14	**2013-14**	643	1.00
15	**2014-15**	661	3.00
16	**2015-16**	679	3.00
C.G.R		**3.00%**	
MEAN		**543**	
C.V		**16%**	

[nternational Energy Agency (IEA Statistics ŋ OECD/IEA, http://www.iea.org/stats/index.asp or World development Indicators-last updated: 28/07/2015)

Life Expectancy at Birth			
Sr. No.	**Year**	**Total Age (Years)**	**Annual Percentage Change (%)**
1	**2000-01**	62	0.00
2	**2001-02**	63	1.61
3	**2002-03**	63	0.00
4	**2003-04**	63	0.00
5	**2004-05**	64	1.58
6	**2005-06**	64	0.00
7	**2006-07**	64	0.00
8	**2007-08**	65	1.56
9	**2008-09**	65	0.00
10	**2009-10**	65	0.00
11	**2010-11**	66	1.53
12	**2011-12**	66	0.00
13	**2012-13**	66	0.00
14	**2013-14**	66	0.00
15	**2014-15**	67	1.51
16	**2015-16**	67	0.00
C.G.R		**0.49%**	
MEAN		**65**	
C.V		**2.00%**	

(Source: Derived from male and female life expectancy at birth from sources such as: (1) United Nations Population Division. World Population Prospects, (2) United Nations Statistical Division. Population and Vital Statistics Report (various years), (3) Census reports and other statistical publications from national statistical offices, (4) Eurostat: Demographic Statistics, (5) Secretariat of the Pacific Community: Statistics and Demography Programme, and (6) U.S. Census Bureau: International Database or World development Indicators-last updated: 28/07/2015)

The evaluation analytics comes out with very important statistical data about the formulated Null hypothesis either to accept or reject. The researchers have used one sample t-test to some of the indicators of green economy, at 0.05% significance level for 15 degree of freedom (d.f). The research results show that p-values are less than 0.05. The calculated value of't' is more than the tabulated values in respect of all indicators of green economy. This means that formulated null hypotheses are rejected and given alternatives would be accepted.

If the calculated value of't' exceeds 0.05, and then the difference between x-bar $\bar{x}$ (Sample Mean) and μ (Population Mean) is significant at 5% level. On the other hand, if 't'≤ 0.05, then the difference between $\bar{x}$ and μ is not significant and hence the sample might have been drawn from a population with mean= μ.

Thus, we have seen from the above research data that the green energy indicators analyzed have been contributing in attaining the green economy concept for India.

CONCLUSION

The research paper discussed some indicators from the main domains of green economy with reference to India. It shows that some indicators show positive trends, which are conducive to green economy. This amply reiterates that India has adopted the strategy of green economy and is fast marching in that direction.

Further, it is high time that along with campaigning and environmental awareness building, the citizens and organizations should indulge into ecological development through environmental promotion and protection projects. Centre for Science and Environment, New Delhi is one such renowned environmental NGO specializing in sustainable natural resource management along with `knowledge-based activism' to cope with India's environmental threats - ecological poverty, land degradation, toxic degradation, etc. It does research, investigate and carry out educational work in the field of pollution, forest, wildlife, land and water use. Another such body is Indian Environmental Society (IES) Delhi, a non-profit development organization, promoting Environmental Improvement Initiatives in India. IES is active in Environmental Education, Biodiversity Conservation, Information Dissemination, Solid Waste Management, and Eco- Technology & Heritage Conservation. Centre for Environmental Education (CEE), Ahmedabad has primarily been set up to spread awareness of environmental issues and to find solutions for them. They mainly aim to create environmental awareness in the communities for which they conduct widespread environmental education and training programs through a very vast network. They do lot of projects related to conservation of biodiversity and eco-development. The Green Life Social Welfare Association, Nagpur is also one such body with an objective to promote tree plantation and protection of the environment. It creates awareness in the society for good health, education and peace. It also does water conservation and water harvesting campaigns and energy conservation and wildlife protection campaigns, including campaigns to reduce air, water and noise pollution.

Pani Panchayats (initially named Water Users Associations), Orissa is promoting participatory irrigation management for improving irrigation along with sustainability of the system. Stree Mukti Sanghatana, Mumbai aims to address the issue of waste management through one of its projects called Parisar Vikas, in which women are self employed for collecting waste and organic manure making. Similarly Green Bandhu Eco Solutions, Delhi are engaged in waste and water management practices in schools, households and communities in user friendly and cost effective manner.

This also takes into account some sectoral organisations. For example 'Narmada Bachao Andolan', Gujarat was set up to protest against the construction of large dams that was affecting lives of many; their livelihood was totally destructed and had everything at stake. It aimed to advocate and educate the affected people to stand and raise their voices against the environmental degradation and help these people get a substantial share of the government's developmental scheme. Another such struggle has been the 'Chipko Movement'. This was against green felling; villagers were organized and raised their voice. This was a gesture with growing awareness toward rapid deforestation in the Himalayas of Uttarakhand and Uttar Pradesh.

The Energy and Resources Institute (TERI), Delhi is another prominent green organizations. It

is an independent not-for-profit research institute. Its mission is to develop and promote technologies, policies and institutions for efficient and sustainable use of natural resources. Centre for Environment Education (CEE), Technology, Education, Research & Rehabilitation for Environment (TERRE), National Environmental Engineering Research Institute (NEERI) are some of other institutions, working in this field. The list is very long. However, there is still a long way to tread. The world celebrated 'Earth Day2018' on 22nd April'2018, which is the world's largest environmental movement. This year, the theme was 'End plastic pollution'. It was also celebrated in India with great fanfare.

No effort to provide livelihood, generate employment, enhance profitability and increase GDP can ignore environmental footprint and long term sustainability. There is a need for more Water treatment plants, Sewage treatment plants, Effluent Treatment plants, Solar Parks, Wind turbines, Solid waste management etc. Both profitable business and livelihood for the people must be addressed within the framework of sustainable development.

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